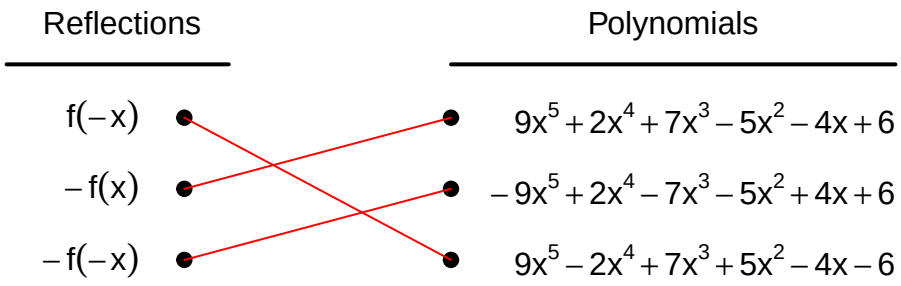
Name: Date:

# Exam: Function Reflections (Solution version 17)

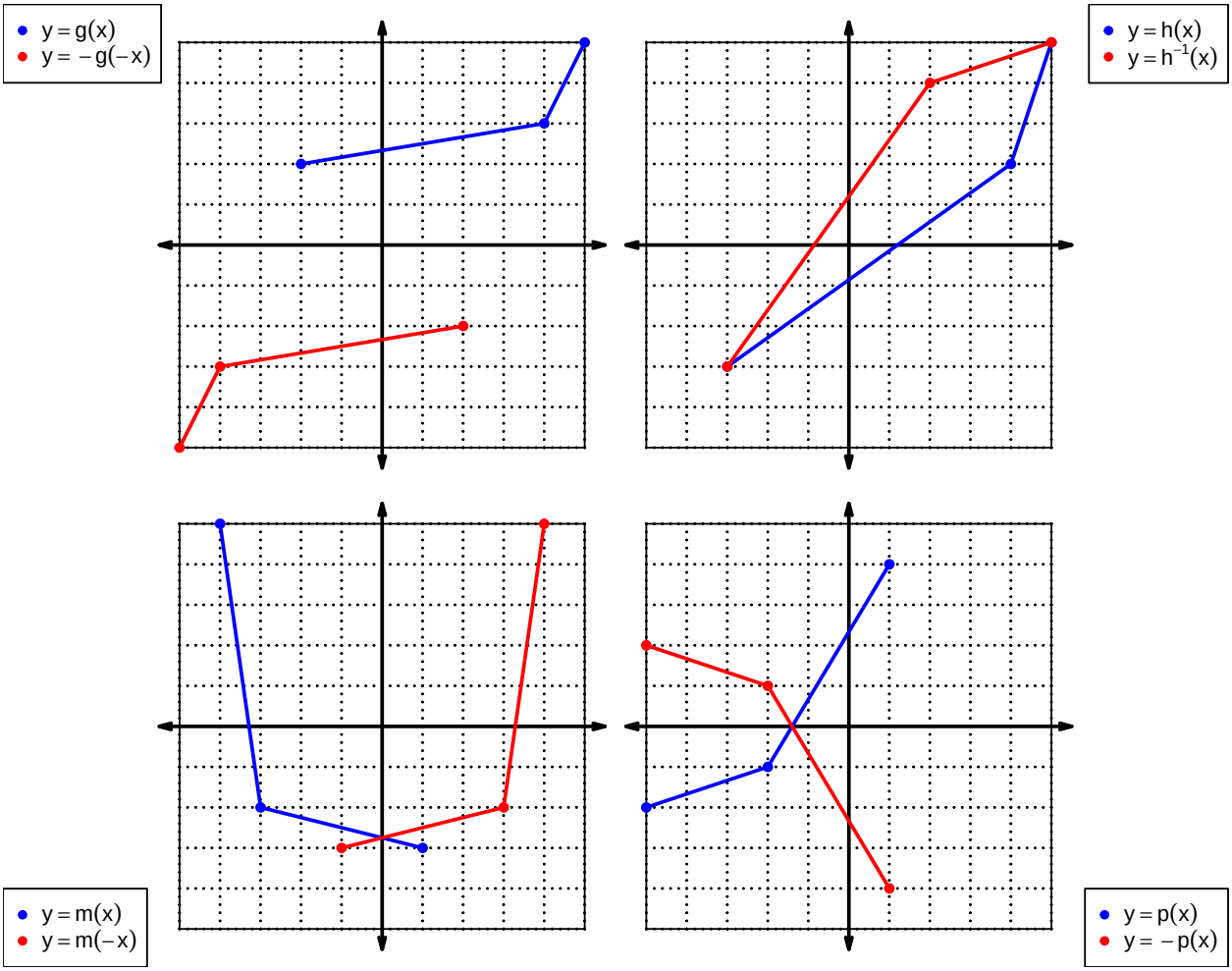
1. Let function $f$ be defined by the polynomial below:

$$f(x) = -9x^5 - 2x^4 - 7x^3 + 5x^2 + 4x - 6$$

Draw lines that match each function reflection with its polynomial:




2. In each $xy$ plane shown below, a function is graphed with blue. Draw the indicated reflections (as a second curve, indicated in legend) with black (or with whatever you have). The $x$ axis is horizontal and the $y$ axis is vertical (as typical), and the scale is equal on both axes.



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For all questions on this page, the functions $f$, $g$, and $h$ are defined by the table below.

| $x$ | $f(x)$ | $g(x)$ | $h(x)$ |
|---|---|---|---|
| 1 | 3 | 7 | 2 |
| 2 | 5 | 9 | 6 |
| 3 | 6 | 8 | 9 |
| 4 | 4 | 3 | 1 |
| 5 | 9 | 4 | 3 |
| 6 | 2 | 5 | 8 |
| 7 | 8 | 2 | 5 |
| 8 | 7 | 1 | 4 |
| 9 | 1 | 6 | 7 |

3. Evaluate $g(6)$.

$$g(6) = 5$$

4. Evaluate $f^{-1}(8)$.

$$f^{-1}(8) = 7$$

5. Assuming $f$ is an **even** function, evaluate $f(-1)$.

If function f is even, then

$$f(-1) = 3$$

6. Assuming $h$ is an **odd** function, evaluate $h(-9)$.

If function h is odd, then

$$h(-9) = -7$$

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7. A function, $f$, is **even** if $f(x) = f(-x)$ for all $x$ in the domain. A function, $g$, is **odd** if $g(x) = -g(-x)$ for all $x$ in the domain.
   Let polynomial $p$ be defined with the following equation:

$$p(x) = -x^3 - x$$

   a. Express $p(-x)$ as a polynomial in standard form.

$$p(-x) = -(-x)^3 - (-x)$$
$$p(-x) = x^3 + x$$

   b. Express $-p(-x)$ as a polynomial in standard form.

$$-p(-x) = -\left(x^3 + x\right)$$
$$-p(-x) = -x^3 - x$$

   c. Is polynomial $p$ even, odd, or neither?

   odd

   d. Explain how you know the answer to part c.

   We see that $p(x) = -p(-x)$ for all $x$ because $p(x)$ and $-p(-x)$ are equivalent polynomials. Thus function $p$ satisfies the criterion for being an odd function.

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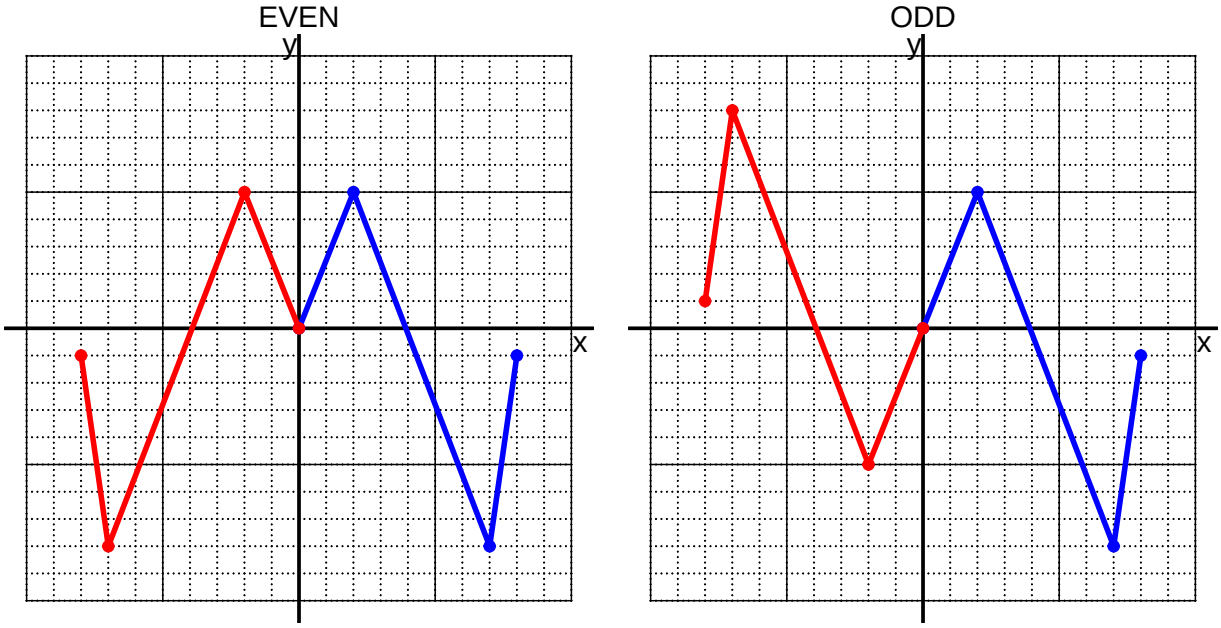
8. I have drawn half of a function. Draw the other half to make it even or odd.




9. Let function $f$ be defined with the equation below.

$$f(x) = 2x - 7$$

a. Evaluate $f(42)$.

step 1: multiply by 2
step 2: subtract 7

$$f(42) = 2(42) - 7$$
$$f(42) = 77$$

b. Evaluate $f^{-1}(85)$.

step 1: add 7
step 2: divide by 2

$$f^{-1}(x) = \frac{x+7}{2}$$
$$f^{-1}(85) = \frac{(85)+7}{2}$$
$$f^{-1}(85) = 46$$

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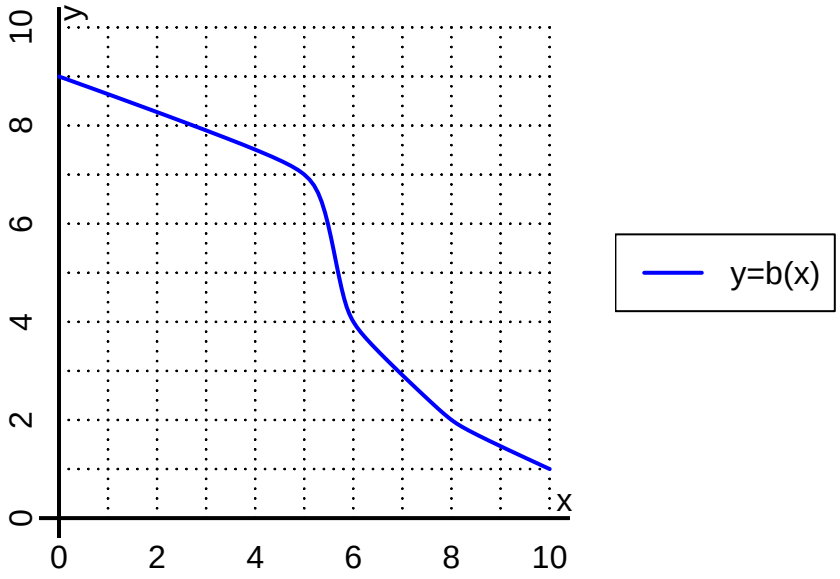
10. The function $b$ is represented by the curve $y = b(x)$ graphed below.




a. Evaluate $b(8)$.

$b(8) = 2$

b. Evaluate $b^{-1}(7)$.

$b^{-1}(7) = 5$

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11. Function $f$ is defined by the table below.

    a. Complete the columns for $-f(x)$ and $f(-x)$ and $-f(-x)$.

| $x$ | $f(x)$ | $-f(x)$ | $f(-x)$ | $-f(-x)$ |
|---|---|---|---|---|
| -2 | -3 | 3 | -3 | 3 |
| -1 | -5 | 5 | 5 | -5 |
| 0 | 0 | 0 | 0 | 0 |
| 1 | 5 | -5 | -5 | 5 |
| 2 | -3 | 3 | -3 | 3 |

b. Is function $f$ even, odd, or neither?

neither

c. How do you know the answer to part b?

Function $f$ is neither because neither column $-f(-x)$ nor column $f(-x)$ matches column $f(x)$ exactly.